

WHAT IS CLAIMED IS:

1. A telemetry system comprising:
  - a plurality of acoustic sensors for receiving acoustic information and generating analog signals based on the received acoustic information;
  - 5 a first plurality of subsystems coupled to at least a subset of the plurality of acoustic sensors, the first plurality of subsystems configured to receive the analog signals from the acoustic sensors and generate digital values based on the received analog signals;
  - 10 a first optical splitter;
  - 15 a first optical transmitter for transmitting a first set of optical pulses to the first optical splitter, the first optical splitter configured to transmit the first set of optical pulses to each subsystem in the first plurality of subsystems, each subsystem in the first plurality of subsystems configured to modulate the first set of optical pulses based on the generated digital values and thereby generate a modulated optical pulse stream;
  - 20 a first optical combiner for receiving and combining the modulated optical pulse stream from each subsystem in the first plurality of subsystems, thereby generating a combined modulated optical pulse stream; and
  - 25 a first optical receiver for receiving the combined modulated optical pulse stream from the first optical combiner, the first optical receiver configured to generate electrical signals based on the received combined modulated optical pulse stream.
2. The telemetry system of claim 1, wherein the telemetry system is an underwater acoustic telemetry system for use in a submersible vehicle.
3. The telemetry system of claim 2, wherein the plurality of acoustic sensors, the first plurality of subsystems, the first optical splitter, and the first optical combiner are configured to be positioned outboard of the submersible vehicle, and the first optical transmitter and the first optical receiver are configured to be positioned inboard of the submersible vehicle.

4. The telemetry system of claim 1, wherein the first optical splitter is a passive optical splitter, and wherein the first optical combiner is a passive optical combiner.

5

5. The telemetry system of claim 1, wherein a duty cycle of the first set of optical pulses is about  $1/(2N)$ , where N represents the number of subsystems in the first plurality of subsystems.

10 6. The telemetry system of claim 1, wherein the combined modulated optical pulse stream is in a time division multiplexed format.

7. The telemetry system of claim 1, wherein the combined modulated optical pulse stream is in a time division multiplexed format and a wavelength division multiplexed format.

15 15. The telemetry system of claim 1, wherein each subsystem in the first plurality of subsystems includes an optical modulator for modulating the first set of optical pulses based on the generated digital values.

8. The telemetry system of claim 1, wherein each subsystem in the first plurality of subsystems includes an optical modulator for modulating the first set of optical pulses based on the generated digital values.

20 9. The telemetry system of claim 8, wherein each optical modulator modulates the first set of optical pulses by passing and blocking optical pulses in the first set of optical pulses.

25 10. The telemetry system of claim 1, and further comprising:  
a second plurality of subsystems coupled to at least a subset of the plurality of acoustic sensors, the second plurality of subsystems configured to receive the analog signals from the acoustic sensors and generate digital values based on the received analog signals;

30 a second optical splitter;

a second optical transmitter for transmitting a second set of optical pulses to the second optical splitter, the second optical splitter configured to transmit the second set of optical pulses to each subsystem in the second plurality of subsystems, each subsystem in the second plurality of subsystems configured to 5 modulate the second set of optical pulses based on the generated digital values and thereby generate a modulated optical pulse stream;

a second optical combiner for receiving and combining the modulated optical pulse stream from each subsystem in the second plurality of subsystems, thereby generating a combined modulated optical pulse stream; and

10 a second optical receiver for receiving the combined modulated optical pulse stream from the second optical combiner, the second optical receiver configured to generate electrical signals based on the received combined modulated optical pulse stream.

15 11. The telemetry system of claim 1, and further comprising:  
a second plurality of subsystems coupled to at least a subset of the plurality of acoustic sensors, the second plurality of subsystems configured to receive the analog signals from the acoustic sensors and generate digital values based on the received analog signals;

20 a second optical splitter;  
a second optical transmitter for transmitting a second set of optical pulses to the second optical splitter, the second set of optical pulses having a different wavelength than the first set of optical pulses, the second optical splitter configured to transmit the second set of optical pulses to each subsystem in the second plurality of subsystems, each subsystem in the second plurality of subsystems configured to modulate the second set of optical pulses based on the generated digital values and thereby generate a modulated optical pulse stream; and

25 the first optical combiner configured to receive and combine the modulated optical pulse stream from each subsystem in the first plurality of subsystems and the second plurality of subsystems, thereby generating a 30

combined modulated optical pulse stream, the combined modulated optical pulse stream being in a time division multiplexed format and a wavelength division multiplexed format.

- 5        12.    A system for remotely retrieving data from an array of sensors, the system comprising:
  - an optical source for generating a stream of optical pulses;
  - an optical splitter for splitting the stream of optical pulses into a plurality of streams of optical pulses;
- 10        a plurality of optical modulators, each optical modulator configured to receive one of the plurality of streams of optical pulses, each optical modulator configured to receive sensor information from at least one of the sensors, each optical modulator configured to modulate the received stream of optical pulses based on the received sensor information and thereby generate a modulated stream of optical pulses;
- 15        a plurality of optical modulators, each optical modulator configured to receive one of the plurality of streams of optical pulses from each of the optical modulators and combining the modulated streams of optical pulses into a combined modulated stream of optical pulses; and
- 20        an optical receiver for receiving the combined modulated stream of optical pulses.

  

13.        The system of claim 12, wherein the array of sensors is an array of acoustic sensors.
- 25        14.    The system of claim 12, wherein the system is an underwater acoustic telemetry system for use in a submersible vehicle.
15.        The system of claim 12, wherein the optical splitter is a passive optical splitter, and wherein the optical combiner is a passive optical combiner.

16. The system of claim 12, wherein a duty cycle of the stream of optical pulses is about  $1/(2N)$ , where N represents the number of optical modulators.

17. The system of claim 12, wherein the combined modulated stream of optical pulses is in a time division multiplexed format.

18. The system of claim 12, wherein the combined modulated stream of optical pulses is in a time division multiplexed format and a wavelength division multiplexed format.

10 19. The system of claim 12, wherein each optical modulator modulates the received stream of optical pulses by passing and blocking optical pulses in the received stream.

15 20. A method for remotely retrieving data from an array of sensors, the method comprising:  
remotely generating a plurality of streams of optical pulses;  
receiving the plurality of streams of optical pulses with a plurality of optical modulators;  
20 modulating each of the received streams of optical pulses with the plurality of optical modulators based on sensor information generated by the array of sensors, and thereby generating a plurality of modulated streams of optical pulses;  
combining the plurality of modulated streams of optical pulses into a  
25 combined modulated stream of optical pulses;  
transmitting the combined modulated stream of optical pulses; and  
remotely receiving the transmitted combined modulated stream of optical pulses.

30 21. The method of claim 20, wherein the array of sensors is an array of acoustic sensors.

22. The method of claim 20, wherein a duty cycle of the plurality of streams of optical pulses is about  $1/(2N)$ , where N represents the number of optical modulators.

5

23. The method of claim 20, wherein the combined modulated stream of optical pulses is in a time division multiplexed format.

10 24. The method of claim 20, wherein the combined modulated stream of optical pulses is in a time division multiplexed format and a wavelength division multiplexed format.

15 25. The method of claim 20, wherein each of the received streams of optical pulses is modulated by passing and blocking optical pulses in the received streams.